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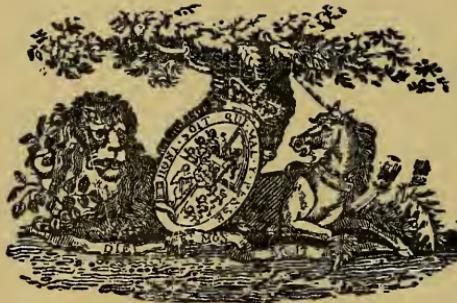
*The 40 YEAR  
MARCH of  
RADIO*



GENERAL JAMES G. HARBORD



*A Newcomen Address*



*“Were American Newcomen to do naught else, our work is well done if we succeed in sharing with America a strengthened inspiration to continue the struggle towards a nobler Civilization—through wider knowledge and understanding of the hopes, ambitions, and deeds of leaders in the past who have upheld Civilization’s material progress. As we look backward, let us look forward.”*

—CHARLES PENROSE

*Senior Vice President  
for North America*

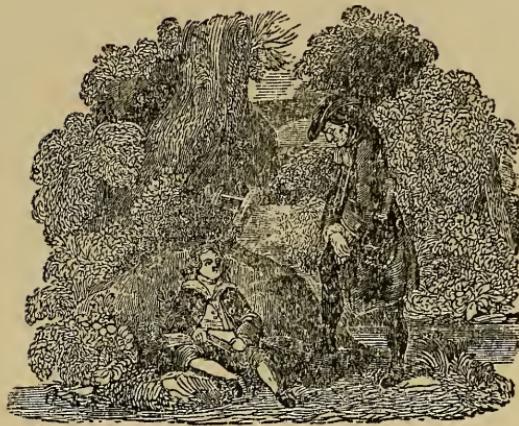
*The Newcomen Society  
of England*



*This statement, crystallizing a broad purpose of the Society, was first read at the Newcomen Meeting at New York World’s Fair on August 5, 1939, when American Newcomen were guests of The British Government*

*“Actorum Memores simul affectamus Agenda”*

*The 40 YEAR MARCH of RADIO*

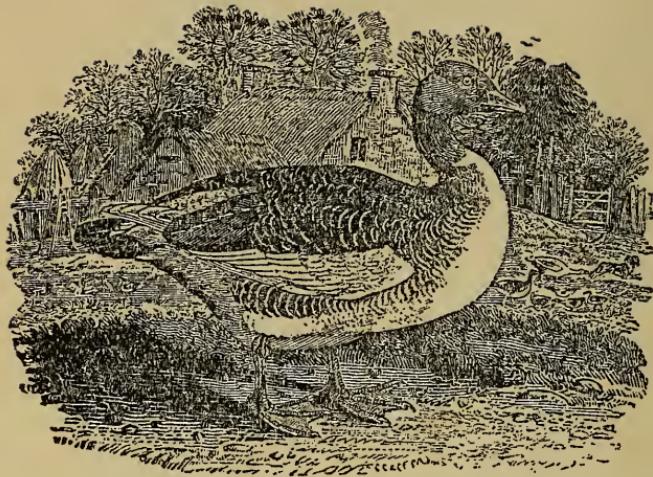


“At a time when Civilization is weighted and worried by war, there is especial satisfaction in being privileged to meet the members and guests of our American branch of The Newcomen Society of England.

“This North American group of the great Newcomen Society is primarily *a symbol of ideals* shared by the two great English-Speaking peoples which loom with dramatic importance in their unity at this near crisis of our civilization.”

—GENERAL JAMES G. HARBORD





"The story I try to tell you is the romance of a fast-moving era's precocious and versatile child, familiarly called '*radio*' in America and called '*wireless*' in England. Implicit in radio's every adventure is the wider story of constantly increasing momentum in the scientific and industrial accomplishments that change and enrich our daily lives. We take *speed* so much for granted today that we cannot realize how much the momentum of achievement in nearly every field has increased, *until we look into the past.*"

—GENERAL JAMES G. HARBORD



THE NEWCOMEN SOCIETY  
AMERICAN BRANCH

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*The 40 YEAR*  
*MARCH of*  
**RADIO**

*By*

LIEUTENANT GENERAL JAMES G. HARBORD  
K.C.M.G., D.S.M., LL.D., U.S. Army (Ret.)

Member of The Newcomen Society

*Chairman of the Board*  
*Radio Corporation of America*



*A Newcomen Address*

1943

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JAMES G. HARBORD



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upon the occasion of a National Newcomen  
Dinner, held in General Harbord's honor at  
Union League Club of New York, on  
February 17th, 1943*

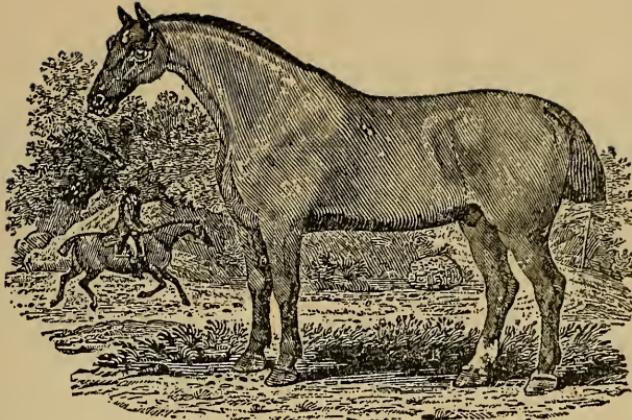


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“Scarcely more than forty years after Marconi had spanned the Atlantic by his ‘wireless,’ an American flyer in the present Second World War, whose bomber plane was equipped with a radio direction finder and other miracle-working wireless devices, was reporting casually through thin air over the same Atlantic in a message rivalling Caesar’s *Veni, Vidi, Vici* for terseness. By sheer chance he chose to use liberally the historic ‘S’ of wireless, in his message: ‘Sighted sub; sank same.’ ”

—GENERAL JAMES G. HARBORD



THE NEWCOMEN SOCIETY OF ENGLAND  
AMERICAN BRANCH



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## *Biographical Sketch of The Author*



“THE ROADS YOU TRAVEL so briskly lead out of dim antiquity, and you study the past chiefly because of its bearing on the living present and its promise for the future.” Through the years, you have found these words, by GENERAL JAMES G. HARBORD, at the end of every publication issued by American Newcomen. This lifelong friend of L. F. Loree and of George B. Cortelyou has been a staunch supporter of your Society, keenly conscious of its ideals and traditions, sympathetic always in its work. Chief of Staff, A.E.F., in France, during the First World War, General Harbord has been recipient of numberless recognitions by American universities and at the hands of foreign governments; as well as D.S.M. of both U.S. Army and U.S. Navy. He is Knight Commander of The Most Distinguished Order of St. Michael and St. George—is one of the few Americans ever to be so honored by His Britannic Majesty—in an Order of the British Empire established in 1818 to commemorate the placing of the Ionian Islands under the protectorate of Great Britain. General Harbord knows England; he has warm friends in the Royal Navy and in the British Army; as well as among the leadership of the United Kingdom. We think of him as an especial link between the British Newcomen and the Society in North America; for long, he has served as an American Member of Council (London), in The Newcomen Society of England. No other American more fittingly could occupy that post. General Harbord is known throughout American Newcomen—from Coast to Coast. His service to America has been of the very highest order.



# *The 40 YEAR* M A R C H *of* **RADIO**



**A**T A TIME when Civilization is weighted and worried by war, there is especial satisfaction in being privileged to meet the members and guests of our American branch of The Newcomen Society of England.

This North American group of the great Newcomen Society is primarily *a symbol of ideals* shared by the two great English-Speaking peoples which loom with dramatic importance in their unity at this near crisis of our civilization. This meeting brings to mind and heart the memory of countrymen of ours, some dead and some still among us, who have led and dominated in the counsels and accomplishments of this Society from its inception. There come to my mind at the moment such figures as the bearded, somber and wise Leonor F. Loree, in his time one of the great railroad chiefs of his generation; the charming and able George B. Cortelyou who only narrowly escaped a nomination for the Presidency of the United States urged through the enthusiastic affection of his friend and chief, Theodore Roosevelt; the slightly satirical

Newcomb Carlton, already outstanding in American Industry when he went to the Western Union and to leadership of the telegraph system of the country, a man of wide culture and philosophy outside his special career; Ralph Budd, a great railroad executive and a pioneer in railroad equipment where his vision and courage advanced us a full generation; General Charles G. Dawes, friend and counsellor of McKinley and Hanna, a great banker and Comptroller of the Currency, bred as a lawyer and engineer, destined to become an officer under Pershing in France, thence Director of the Budget, later Vice-President of the United States, and subsequently The American Ambassador to The Court of St. James; Sir Edward Beatty, if I may cross the Canadian line, whose fame is forever linked with that of Canada and the Canadian Pacific,—and not forgetting William C. Dickerman, the kindest chairman that ever presented a timid and shrinking speaker, besides being Chairman of the Board of the American Locomotive Company, and greatest builder of locomotives in our time. On every such scroll of Newcomen fame we find enrolled that fertile brained, persuasive, and persistent Dr. Charles Penrose, descendant of a race of colonial shipbuilders and engineers who for over two hundred years have reigned and ruled in the Delaware Valley, and himself an engineer of distinction.

*“As we look backward, let us look forward,”* our Senior Vice-President for North America has said—and I can testify affectionately, in passing, that Dr. Charles Penrose applies his forward look even to minor events. Fully thirteen months ago he warned me to get ready for a speech tonight; and he has been reminding me at intervals ever since, with results doubtfully justifying his perseverance.



One cannot speak of these men without the aims which they have had in mind in this Society. Two such aims are evident

and are often cited: *1st*, the promotion and guidance of national material progress in distinction from political progress, and study and research in *the history* of the mechanic and engineering arts and of agriculture; *2nd*, the continuity of friendly relations between Great Britain and the United States, independent of commercial profit and loss, to which our North American group has devoted itself for the more than twenty years since its foundation on our shores. There is *a third* mission of this Society, devoted to the spiritual side of American life, but unnamed in any prospectus, in any list or catalog of virtues, not mentioned in any pronouncement of oratory, nor ever publicly spoken in the words of any of its long list of distinguished members. I am bold enough to say that consciously or not its *works*, if not its words, have been and are contributing to the honor and glory of The Most High.



Instead of touring the dizzy heights of rarefied ideology—where crackpot traffic congestion makes travel particularly perilous at present—your society promotes understanding of world problems in a much more effective way: by studying the history of advances in engineering and industrial technology. Your viewpoint, however, is never like that of the mythological bird who flew backward because he was more interested in where he had been than in where he was going. You concentrate upon the advances that have aided Man's progress, for the sound reason that they give promise for the future.



The story I try to tell you is the romance of a fast-moving era's precocious and versatile child, familiarly called “*radio*” in America and called “*wireless*” in England. Implicit in radio's every adventure is the wider story of constantly in-

creasing momentum in the scientific and industrial accomplishments that change and enrich our daily lives. We take *speed* so much for granted today that we cannot realize how much the momentum of achievement in nearly every field has increased, *until we look into the past*:



It was in 1705 that the inventive genius, Thomas Newcomen, for whom our society was named, took out with Captain Thomas Savery and John Calley a patent on a "fire engine." He was applying the mechanical power of steam which had been ineffectively used as far back as 120 B.C. by Hero of Alexandria, who built a sort of suction wheel. *Sixty long years*, between 1705 and 1765, passed before James Watt devised a separate condenser to eliminate the loss of power in Newcomen's engine. *Nearly a half-century more* dragged by, before George Stephenson designed a locomotive which was successfully tried in 1814. It was five years later still, when Stephenson laid down a short railway and became, from then on, a railway designer.



Contrast this *slow* progress with the *lightning leap of radio*, so typical of our modern industrial age. The last month of 1901 was half gone when Guglielmo Marconi, hitching his hope-wagon to an antenna kite in a Newfoundland gale, heard the letter "S" flashed from Poldhu on the southwest tip of England, as a pre-arranged signal to test whether *trans-oceanic wireless* was possible. Scarcely more than forty years later, an American flyer, in the present Second World War, whose bomber plane was equipped with a radio direction finder and other miracle-working wireless devices, was reporting casually through thin air over the Atlantic in a message rival-

ing Caesar's "*Veni, Vidi, Vici*" for terseness. By sheer chance he chose to use liberally the historic "S" of wireless, in his message: "*Sighted sub; sank same.*"



Scarcely more than forty years have elapsed since Marconi's first feeble trans-oceanic signal. But *in thirty million homes* in the United States there were *radio* receiving sets through which the living voices of commentators could speak of this young flyer's exploit and of his unpretentious words. Radiotelegraph circuits, operating daily between the United States and the farthest lands, were ready to wing the story by dots and dashes to newspapers of all countries who wanted it. If photographs were desired, they too could be sent by *radio facsimile* from RCA, New York, to London, Moscow, Stockholm, Cairo and Buenos Aires, while the terminal at San Francisco was plucking out of space other pictures from Melbourne and Honolulu. The incident could be included in short-wave broadcasts to our fighting men on far-flung fronts and, in forty languages, to nations all around the globe. The nonchalant aviator could have stood in RCA's television studio in New York, to be seen, as well as heard, on *television* receiving sets throughout the area.



*This constantly accelerating pace* of scientific and industrial achievements has not come by accident, nor because men today are more brilliant than in the days of Newcomen, Watt, and Stephenson. It has come because the industries of America and England, as well as other sections of the world, are attuned to research and organized for rapid change. There could be no better illustration than Radio in America: of how the partnership between invention and practical applications

to useful daily services, works for fast forward strides in a free society.



In the RCA Laboratories at Princeton, New Jersey—a new center of radio research and pioneering—the Optic Laboratory's bays are ingeniously connected by a series of door-like windows. The purpose, no doubt, is to provide a long focus through one room after another to the ultimate wall. Yet it has occurred to me that this opening of vistas from the first room to the next, and from that one on and on until the final boundary is reached, is an excellent illustration of the way in which modern research and industry *move swiftly ahead*; each advance opening a window for a further advance.

For radio in America, the first room might be said to include the space between the front door which Marconi unlocked and the wall of the First World War. Within the confines of that room, which looks so extremely small in retrospect, the American Marconi Company centered its immediate practical interest upon ending the age-old silence of the seas. The early dots and dashes of marine radio could attain *only ten words a minute* and could travel in daytime *scarcely fifty miles*. This was a great many miles farther than Columbus, or John Paul Jones, or Nelson, or Admiral Dewey could signal; so there would have been no doubt about the worth of the invention if it had never taken a single additional step.



Even before the First World War, radio engineers had visions of *transoceanic communication*. The dreams were not exclusively "made in America." Other nations, including Germany and France, looked with a cold, fishy eye upon the international telegraph dominance tightly wrapped in un-

counted leagues of British cables, and contemplated international *wireless* telegraph circuits that would have been impossible with the apparatus then available.



The First World War saved the daring planners the embarrassment of having to prove their point. A presidential proclamation the day after the declaration of hostilities took over all radio stations in the United States and in its possessions, which the Army did not already control. Our station at New Brunswick, New Jersey, became the most powerful on the globe, when its 50-kilowatt Alexanderson Alternator was superseded by one of 200 kilowatts. By the time the war ended, radio's growth had been stimulated to the stage where it could reasonably begin thinking of changing from short to long waves, and growing up! Subsequent change, from long waves to *short*, ruins my simile about the boy changing his pants; but let it stand as is.

From this point on, directed research quickly opened the successive doors. One of the first led to the exploration of new regions in the spectrum of radio frequencies, which has been described as the paradox of a climb to new accomplishments by going down the stairs into the cellar of shorter and shorter wavelengths.



*A detailed history of these adventures in discovery would require volumes. A central fact is that, by 1926, improved radio tubes and directional transmission, aimed like a search-light beam, had established the regular commercial use of wavelengths between fifteen and thirty meters, giving excellent reception even in daytime, at much faster speeds than could be attained on long waves. Yet even this triumph, then*

hailed with justifiable pride, seems these few years later to belong to a dim, stumbling past.



The shorter wavelengths, providing a wealth of uncrowded radio channels and practically eliminating static as a serious handicap, were found to be subject to *fading*. RCA engineers attacked this new redoubt; and took it, through the development of *diversity reception*, by which the signals of several separate receivers are blended in a single, strong signal. Diversity reception, created first for the dots and dashes of wireless telegraphy, is one of the many inventions which enables you now to hear clearly the words of speakers in daily and nightly broadcasts from the most remote parts of the Earth. Radio, the harbinger of joy or the messenger of trouble, can unite a nation spiritually, can promote understanding and tolerance between peoples, can direct armies and navies—the while, knowing neither day nor night, nor sunshine nor storm.



To say that broadcasting, and radiotelegraphy, and marine radio, and the design and manufacture of apparatus, went forward *side by side* is an understatement. They went forward *hand in hand*, each helping the other over the humps, each exchanging with the others the knowledge gained in practical everyday operation, each pointing out enthusiastically to the others *the room beyond*, opened by its research.

The results of this sharing of experience and ideas, as well as of constant, centrally-directed scientific investigation, are being demonstrated most dramatically in America's Second World War. The requirements of military secrecy prevent me from giving you more than the "high spots" of that demonstration.

One and a half million fighting men of the United States are engaged now, at more than sixty places scattered around the sphere. Only radio, linking continents and ships and planes and submarines and tanks, could give organized, unified communication to such a force. The immature wireless, which met well its first limited military test in World War I, in France, could not even begin to accomplish the present gigantic task.



Our most distant commander is no farther from Washington headquarters than the few steps to his own radio transmitter and receiver. By radio, bombers can fly blind, armadas, like the one of 850 warships and transports that landed in the Autumn of 1942 in North Africa, can move in perfect unison. Even the individual soldier carrying a light "walkie-talkie," can communicate with his company while on an isolated mission. So far as I know, not one of them has been tempted by distance to indulge the hazardous, though understandable, yearning to talk back to a top sergeant.



The portability, compactness, efficiency, and great reliability of military radio now have been brought to fulfillment by the marvelous development of the *radio-electron tube*, which began to find service in the Army and Navy only in the last period of the First World War. Up to those final days in France in 1918, we had been entirely dependent on heavy wireless apparatus using the spark transmitter and crystal detectors. In this year of 1943, America is fighting a streamlined, total war, with streamlined radio in total production. No Axis power is doing better; only one approaches it. Our factories today are pouring out for our armed forces the finest radio equipment ever made anywhere.

Immediately after the outbreak of war in Europe in 1939, and more than two years before Pearl Harbor, the manufacturing facilities of RCA began to be converted to production for military requirements. Early last year, the making of civilian radios ceased entirely. Working hours, methods, and manpower all are directed exclusively toward "beating the promise," and doing radio's utmost, as its part with other American industries in ultimate victory.



Exactly what radio equipment is being turned out now and the exact uses to which it is being put, are military secrets. Open announcement has been made, however, that the industry, which produced \$11,000,000 worth of tubes in 1941 and had a total pre-war production of around \$300,000,000 a year, started this year with *a four billion dollar program* for our fighting forces in 1943-44. In addition to the public proclamation of excellent achievement by Army-Navy "E" pennants, which float unfurled over radio plants, there is the recent flat statement by the director of the radio division of the War Production Board, Ray C. Ellis: "Radio is our best converted industry."



While news and vital messages flash between our continent and others by radiotelegraph at a speed in words per minute that dwarfs the best efforts in the First World War, *broadcasting*—still unborn when that war ended—is *building morale* in our homes. The voice of radio, which entertains and informs Americans—and also sells them War Bonds—is turned upon the Axis countries, too. It goes to them in international programs more potent than a gun whose projectile could carry the Atlantic.

The ammunition is *truth*—truth about Allied aims and the actual progress of the war. The American short-wave program method stands in sharp contrast to that of Hitler. He has said brazenly that propaganda must play upon emotions and address itself “only very sparingly to the so-called reason.” Germany and the European countries under the yolk—amazed at the freedom of a democratic radio which will broadcast a Hitler speech to all America in full—are listening to what *we* have to say. The best possible proof of the wartime effectiveness of our short-wave programs can be found in the Nazi penalties for being caught listening to one, penalties ranging in severity from the concentration camp to the headsman’s axe.



These are great days for the scientists and engineers in the closely-guarded laboratories of America, where new devices are being planned, to be forged by industrial plants into the tools of victory. Though there are weary months ahead, the final victory is sure. The Axis cannot stand again the inexorably rising tide of men from the United States and her Allies and against the inexorably rising tide of materials supplied by the twenty-five typewriter girls and eighteen male civilians back of *every* fighting American.



When victory is won, at last, a great wealth of knowledge and skill and manpower will be ready to be turned from *destruction to construction*. Those who have watched the wartime developments in television, for example, in which the present laboratory advance cannot be disclosed, expect *television* to establish the basis for a great industry, after the war. A new *electron microscope*, small enough and inexpensive enough to be used by hundreds of medical, university, and

industrial research institutions, is capable of magnifying infinitesimal bits of matter *up to 100,000 times*. Under the pressure of speed and efficiency, the industrial use of *the science of electronics*, created by radio, has increased tremendously. Radio frequency heating, supersonics, and many other applications have been brought within reach, by new radio tubes.



In other industries, comparable advances are waiting to be offered to a better world *when the lights come on again*. They can be offered with spectacular swiftness; not through dragging years, as in the early age of invention which Newcomen, Watt, and Stephenson lighted by their genius. The very speed with which vast improvements can come—in aviation, automobiles, new materials, housing, and in other fields—is a challenge to us to make the very most of our broad opportunities; to keep our eye upon America's far horizon.

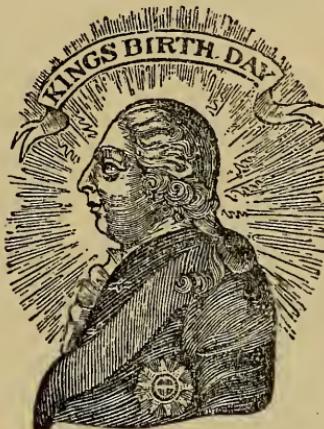


*To attain the fullest measure of the enrichment of our daily lives* offered by scientific and industrial progress, *our first thought* should be: that the peace we make when victory at last is won *shall be a peace that will endure*. By which I mean, specifically, that it must be made *impossible* for war-seeking leaders in Germany or in her satellite countries *to make war again*. We must not once more commit the mistake of standing calmly by and watching the re-arming of a Germany, where militarism has been a cult since the Roman Era; or in a Japan *unbroken* through ages eternal, as the Japanese so proudly boast.

*Our second thought*, when peace eventually comes, should strike *closer home*. As loyal and patriotic Americans, we must do everything in our power—to the very limit of power—to carry into the future *our individual initiative, our self-reliance, and our political freedom*. These heritages have created the strong stamina of our Nation—these heritages have created the constantly increasing pace of its truly marvelous inventive progress.

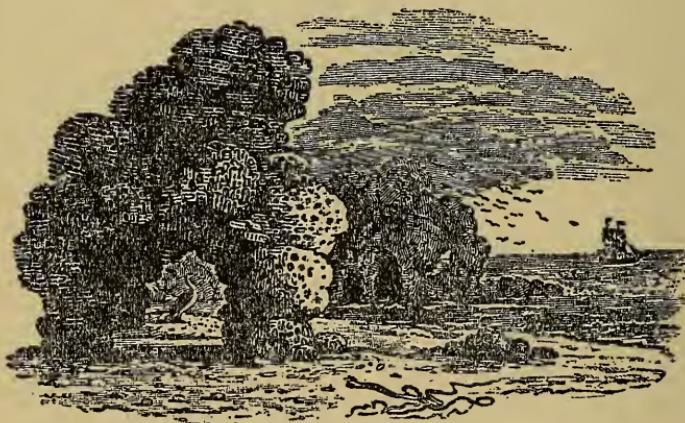
AMERICA is made of such stuff!

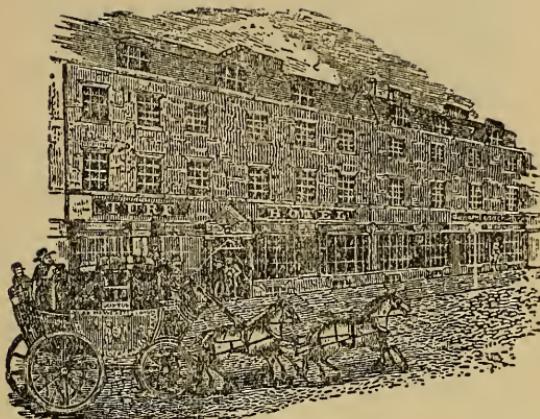
THE END





GENERAL HARBORD, in whose honor this National Newcomen Dinner at Union League Club of New York was held on February 17, 1943, was introduced by his longtime friend, Dr. William Carter Dickerman, Chairman of the Board, American Locomotive Company, Trustee of Lehigh University, President of The Guild of Brackett Lecturers at Princeton University, and Chairman of the New York Committee, in  
The Newcomen Society of England

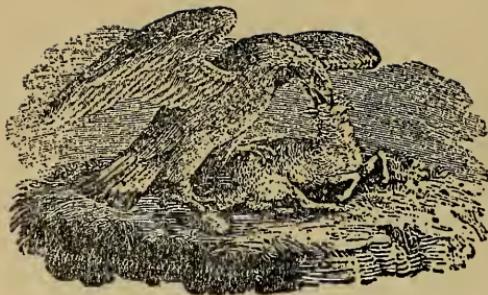




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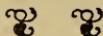


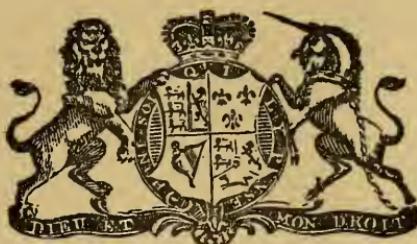
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“AMERICA is made of such stuff!”

—GENERAL JAMES G. HARBORD





In Memoriam  
His Excellency  
The Most Honourable  
The Marquess of Lothian  
His Britannic Majesty's Ambassador  
to the United States of America  
1939-1940



*"LORD LOTHIAN'S memory forever will be  
cherished by The Newcomen Society of England"*



*His Excellency The Most Honourable THE MARQUESS OF LOTHIAN  
(1882-1940), His Britannic Majesty's Ambassador to the United  
States of America, was a member of American Newcomen's Wash-  
ington Committee, until his death at Washington, on December 12, 1940*



*"The roads you travel  
so briskly lead out  
of dim antiquity, and  
you study the past  
chiefly because of its  
bearing on the living  
present and its  
promise for the future."*

—LIEUTENANT GENERAL JAMES G. HARBORD,  
K.C.M.G., D.S.M., U.S. Army (Ret.)

*American Member of Council  
at London, The Newcomen Society*





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